4.1 AIR QUALITY

Section 4.1 describes the air basin that would be affected by the Project, identifies the significance thresholds recommended by the local air district, assesses the Project's potential impacts on air quality, and recommends measures to mitigate significant adverse impacts.

4.1.1 Environmental Setting

Ambient air quality is influenced by the climate, meteorology, and topography of an area along with the quantity and type of pollutants released to the air. This section describes climate and air quality characteristics of the North Central Coast Air Basin, an area that includes all of Santa Cruz, Monterey, and San Benito counties.

Onshore Climate and Meteorology. Like much of northern California, the project area is characterized by moderately wet winters and dry summers. The regional climate is dominated by a strong and persistent high pressure system that frequently lies off the Pacific coast (generally known as the Pacific High). The Pacific High shifts northward or southward in response to seasonal changes or the presence of cyclonic storms. Predominant onshore winds and temperatures moderated by the ocean also characterize the study area. Annual precipitation (around 20 inches) occurs almost exclusively between November and April (WRCC 2004).

Offshore Conditions. Prevailing winds are generally from the west and northwest, driven by the Pacific High. Storms and wintertime weather patterns occasionally cause transition and reversal of this flow, but during the summer months, cool marine air flows into the Monterey Bay area from the north-northwest. Wind speeds and wave heights are lowest during July, August, and September. Table 4.1-1 shows the offshore conditions in the Monterey Bay.

Table 4.1-1. Climate Observations in Monterey Bay (Offshore)

Climatic Data		Jun.	Jul.	Aug.	Sept.
Max. Air Temperature	(ºF)	64.4	63.7	66.9	67.8
Min. Air Temperature	(ºF)	48.2	50.5	51.1	50.9
Wind Speed, Average	(knots)	12.3	10.3	10.2	8.4
Wind Direction, Prevailing NNW	(% of time)	49.4	43.6	47.1	41.8
Average Significant Wave	(feet/meters)	6.6/2.0	5.6/1.7	5.3/1.6	5.6/1.7
Max. Significant Wave	(feet/meters)	16.4/5.0	12.5/3.8	12.8/3.9	15.8/4.8

Source: National Data Buoy Center (6/87 to 12/01); NOAA 2004.

Criteria Air Pollutants. With the assistance of the Monterey Bay Unified Air Pollution Control District (MBUAPCD), the California Air Resources Board (CARB) compiles inventories and projections of emissions of the major pollutants and monitors air quality conditions. Air quality conditions are tracked for both "criteria" air pollutants and toxic or hazardous air contaminants. Criteria pollutants are the group of pollutants for which regulatory agencies have adopted ambient air quality standards and formal pollution reduction plans. Criteria air pollutants include ozone, particulate matter, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead. Toxic air contaminants (TACs) and hazardous air pollutants (HAPs) are those that pose a more localized potential hazard to human health. Reactive and volatile organic compounds and gases (VOC) are also regulated pollutants because they are precursors to ozone formation. Two subsets of respirable particulate matter are particulate matter less than ten microns in diameter (PM_{10}) and fine particulate matter less than 2.5 microns in diameter ($PM_{2.5}$).

Ambient Air Quality. Historically, violations of State ambient air quality standards for ozone and particulate matter have occurred in the North Central Coast Air Basin. Since the 1980s, progress has been made toward controlling these pollutants. Although some air quality improvements have occurred, violations of ozone and particulate matter standards are persistent. Ozone violations typically occur in the summer months, mainly as a result of emissions from on-road mobile sources combined with other natural causes, and PM_{10} violations can occur during any time of the year, mainly as a result of airborne road dust, windblown dust, and dust from agricultural activities (MBUAPCD 2004). Transport of pollutants from the San Francisco Bay Area also affects air quality in the inland portions of the North Central Coast Air Basin.

Ambient Air Quality Standards. Concentrations of air pollutants are compared to the current National and California Ambient Air Quality Standards (AAQS). Because regulation of air quality began in California before being coordinated at the national level, the State-level standards established by the California Air Resources Board (CARB) tend to be more stringent than those set forth by the U.S. EPA. The standards currently in effect in California are shown in Table 4.1-2.

Air quality standards are designed to protect those people most susceptible to respiratory distress, such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and people engaged in strenuous work or exercise.

Table 4.1-2. California and National Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards	National Standards
Ozone	1-hour	0.09 ppm	0.12 ppm
	8-hour	---	0.08 ppm
Respirable Particulate Matter (PM_{10})	24-hour	50 $\mu g/m^3$	150 $\mu g/m^3$
	Annual Mean	20 $\mu g/m^3$	50 $\mu g/m^3$
Fine Particulate Matter ($PM_{2.5}$)	24-hour	---	65 $\mu g/m^3$
	Annual Mean	12 $\mu g/m^3$	15 $\mu g/m^3$
Carbon Monoxide (CO)	1-hour	20 ppm	35 ppm
	8-hour	9.0 ppm	9.0 ppm
Nitrogen Dioxide (NO_2)	1-hour	0.25 ppm	---
	Annual Mean	---	0.053 ppm
Sulfur Dioxide (SO_2)	1-hour	0.25 ppm	---
	24-hour	0.04 ppm	0.14 ppm
	Annual Mean	---	0.03 ppm

Source: CARB 2004.
Notes: ppm=parts per million; $\mu g/m^3$= micrograms per cubic meter; "---" =no standard.

Attainment Status. The U.S. EPA and CARB designate those portions of the State where Federal or State ambient air quality standards are not met as "nonattainment" areas. If a pollutant exceeds the AAQS, the Federal and State-level Clean Air Acts require air quality management plans that demonstrate how the standards will be achieved. These laws also provide the basis for the implementing agencies to develop mobile and stationary source performance standards. The regulatory programs are discussed below.

The region was designated as a maintenance area for the one-hour Federal ozone standard in 1997 after meeting the standard in 1994. Violations of the State ozone standard persist, and the State PM_{10} standards are very stringent, meaning that they are violated in nearly every area of the State. Table 4.1-3 summarizes the air quality attainment status for the project area in the North Central Coast Air Basin.

Table 4.1-3. Attainment Status for North Central Coast Air Basin

Pollutant	Federal Designation	State Designation
Ozone	Attainment (Maintenance)	Moderate Nonattainment
PM_{10}	Attainment	Nonattainment
$PM_{2.5}$	Attainment	Unclassified/Attainment
CO	Attainment	Attainment
NO_2	Unclassified/Attainment	Unclassified/Attainment
SO_2	Attainment	Attainment

Source: CARB 2004 and U.S. EPA 2004.

4.1.2 Regulatory Setting

Federal

The Federal Clean Air Act directs the attainment and maintenance of National Ambient Air Quality Standards. The 1990 Amendments to the Clean Air Act established programs for attainment and maintenance of standards. In order to accomplish this, a variety of programs have been established for reducing emissions from mobile sources and stationary sources, and local air management districts are required to implement and maintain air quality management plans.

Emissions from large marine vessels are generally unregulated. Federal emission standards for new marine vessel engines are equivalent to internationally-negotiated limits for NOx (EPA 2003), however, most vessels use engines manufactured before these rules were established. Most particulate matter emissions from marine engines are caused by uncontrolled levels of sulfur in the fuel. International agreements for vessels in sulfur-control areas specify use of fuel with a sulfur content below 15,000 parts per million (ppm). In June 2004, Federal rules were established to reduce the sulfur content of fuel used in land-based marine diesel applications to below 500 ppm by 2007 (EPA 2004). The reduced-sulfur diesel fuel can be used in smaller marine vessel engines (roughly less than 1,500 kilowatts output), but larger marine vessel engines normally are designed for heavier distillate and residual fuel oils, which are not subject to the recent requirements (69 FR §39039, June 29, 2004).

General Conformity Rule. Any project that requires a Federal action for approval, such as the action of Monterey Bay National Marine Sanctuary, would need to comply with Federal general conformity requirements (40 CFR §93.153). The general conformity rule specifies that the Project conform with the local plan for attaining the Federal standards, called the State Implementation Plan (SIP). Because the region is a maintenance area for the Federal ozone standard, any Federal action causing more than 100 tons per year of NOx or VOC must undergo a comprehensive analysis of conformity with the SIP.

State

State-level regulations and laws provide the basis for the following potentially applicable requirements.

- California Air Resources Board, Statewide Portable Equipment Registration Program. Allows operation of portable equipment throughout California without having to obtain individual permits from local air districts.

- California Air Resources Board, Maritime Air Quality Technical Working Group. Presently evaluating possible state-level regulations for marine vessel activities, including a demonstration project of a fuel emulsification system on an ocean-going ship, a proposal that would require certain marine harbor craft to use CARB on-road diesel fuel, and a proposal for use of cleaner fuels in ship auxiliary engines.
- California Air Resources Board, Standards for Diesel Fuel. Since 1993, CARB has specified a maximum sulfur content of 500 ppm for all vehicular diesel fuel, including the fuel used in on-road and non-road equipment in California. After 2006, a sulfur content limit of 15 ppm for must be met. Proposed rules presently being considered by CARB would require smaller, locally-operated marine vessels (harborcraft) to use on-road diesel fuel (CARB 2004).

Local

Construction activities on land are under the jurisdiction of the MBUAPCD. The regulations that may apply to the Project are listed below.

- Rule 400 Visible Emissions. Prohibits any source from creating a visible plume for a period or periods aggregating more than three minutes in any one hour.
- Rule 402 Nuisances. Prohibits any source from causing a public nuisance.

4.1.3 Significance Criteria

Criteria to determine the significance of air quality impacts are based on Federal, State, and local air pollution standards and regulations. An air quality impact is considered significant if any of the following apply:

- Project emissions violate or substantially contribute to an existing violation of Federal or State air quality standards. The MBUAPCD has established that short-term activities causing emissions greater than 82 lb/day PM10 would "substantially contribute" to existing violations of the standards;
- Project emissions exceed thresholds established by the MBUAPCD for the determination of significance of air quality impacts for CEQA purposes or the applicability thresholds of the Federal General Conformity Rule;
- Project pollutants are released in quantities or concentrations sufficient to cause substantial visible emissions, exceeding the limits in MBUAPCD Rule 400, or cause a nuisance, as defined by MBUAPCD Rule 402;

- Project exposes sensitive receptors to pollutant concentrations that exceed health-based standards; or
- Project creates objectionable odors affecting a substantial number of people.

4.1.4 Impact Analysis and Mitigation

The proposed cable route would extend offshore from Moss Landing for 31.7 miles. This air quality analysis considers the emissions that would occur during installation, operation, and decommissioning of the onshore and offshore facilities, including marine vessel activities within the 3-nautical mile (nm) boundary of State waters and the 12-nm U.S. Territorial Sea Boundary. To determine their significance, emissions generated by each Project alternative were compared to thresholds in the local CEQA Air Quality Guidelines (MBUAPCD 2004) and the applicability thresholds of the Federal General Conformity Rule. Consistency of each alternative with the adopted air quality management plan is also described.

According to the MBUAPCD CEQA Air Quality Guidelines, construction projects using typical construction equipment, such as dump trucks, scrapers, bulldozers, compactors, and front-end loaders, which temporarily emit precursors of ozone, i.e., VOC and NOx, are accommodated in the emission inventories of federally- and State-required air quality management plans and would not have a significant impact on the attainment and maintenance of ozone standards. Construction equipment, on-road vehicles, and marine vessels that would be used during cable installation are not subject to MBUAPCD permitting requirements, which normally only apply to installation and operation of permanent stationary sources.

Certain “non-typical” types of construction equipment are not included by the MBUAPCD in the inventories for attainment plans. Marine vessel emissions for construction activities, for example, are not included in the inventory because they do not typically occur with most land-based development. MBUAPCD staff indicates that marine vessel activities causing more than 137 lb/day of any ozone precursor (VOC or NOx) would result in a potentially significant impact on ozone concentrations, even though the activities would be short term (Brennan 2004).

Emission rates were derived from factors established by the U.S. EPA’s recent studies of marine vessels (U.S. EPA 2003) and other studies by the CARB for portable equipment and on-road vehicles. Appendix C includes data and assumptions used to calculate Project-related emissions.

Impact AQ-1: Construction and Decommissioning Emissions

Vessels used for construction and decommissioning could temporarily exceed daily emission thresholds for ozone precursors and particulate matter within the MBUAPCD. (Class II)

Construction and decommissioning activities would affect air quality in the MBUAPCD. The activities would involve on-shore staging and locally intense use of marine vessels. Along the cable route, emissions would occur from support boats and the cable-laying vessel, including propulsion engines, auxiliary power generators, or hydraulic pump engines for the underwater plow or jetting devices. At the landing site, emissions would occur from HDD equipment, drill site preparation of the concrete pad and sump pit, drilling fluid pumping, site cleanup, and the on-road vehicles necessary to bring and remove construction materials, cable, and work crews to the staging area. Decommissioning and cable removal activities have not been identified in detail, but would involve equipment similar to construction.

Tables 4.1-4 and 4.1-5 summarize the results of the emission calculations.

Table 4.1-4. Daily Emissions from Construction

Activity	NOx (lb/day)	VOC (lb/day)	PM_{10} (lb/day)	CO (lb/day)	SOx (lb/day)
Marine Vessels	5,260.1	271.7	309.8	1,065.4	1,740.7
On-Land, Non-Road Equipment *	109.3	9.6	5.3	37.3	2.7
On-Land, On-Highway Vehicles *	6.1	1.1	0.2	8.7	0.1
Fugitive Dust	---	---	7.9	---	---
Total Daily Emissions	5,375.5	282.4	323.2	1,111.4	1,743.4
MBUAPCD Daily Thresholds **	137	137	82	None	None

Notes: * On-land construction equipment are accommodated by the MBUAPCD in attainment plans and do not count against the MBUAPCD Daily Thresholds (MBUAPCD 2004). ** Thresholds established by Section 5.3 and 5.4 of the local CEQA Air Quality Guidelines (MBUAPCD 2004).

Table 4.1-5. Emissions from Total Duration of Construction

Activity	NOx (ton)	VOC (ton)	PM_{10} (ton)	CO (ton)	SOx (ton)
Marine Vessels	23.67	1.22	1.39	4.79	7.83
On-Land, Non-Road Equipment	0.77	0.07	0.04	0.26	0.02
On-Land, On-Highway Vehicles	0.06	0.03	< 0.01	0.26	< 0.01
Fugitive Dust	---	---	0.16	---	---
Total Duration of Construction (ton)	24.5	1.3	1.6	5.3	7.9
General Conformity Thresholds * (ton/year)	100	100	None	None	None

Note: * Applicability thresholds of the Federal General Conformity Rule (40 CFR §93.153).

Marine vessel emissions would exceed the thresholds established by the MBUAPCD. Up to six days of cable-laying, and three additional days of vessel preparation and off-loading could occur within the 12-nm territorial sea area. This would result in approximately nine days when MBUAPCD thresholds could be exceeded, and the emissions could substantially contribute to violations of the ozone and particulate matter standards. This potentially significant impact (Class II) warrants additional mitigation (**MM AQ-1a** and **MM AQ-1b**) to reduce the impact to a less than significant level.

Typical on-land construction equipment that exhausts precursors of ozone, i.e., VOC and NOx, are accommodated in the emission inventories of federally and State-required air quality management plans and, as illustrated by the MBUAPCD Guidelines, these emissions would not have a significant impact on the attainment and maintenance of ozone standards (Class III).

Dust emissions from on-land activities would be minor, less than 82 lb/day, and therefore, would be unlikely to cause or substantially contribute to any violations of particulate matter standards (Class III).

Emissions from the entire construction period are based on a worst-case installation duration of 10 to 14 days. Emissions from all activities combined, over the total duration of construction, would not exceed the applicability thresholds of the Federal General Conformity Rule.

Mitigation Measures for Impact **AQ-1**: Construction and Decommissioning Emissions

MM AQ-1a. **Low-Emission Fuel.** Use CARB on-road diesel fuel in all smaller diesel-powered vessels and in all construction equipment.

MM AQ-1b. **Off-site NOx Mitigation.** Contribute, as determined by the MBUAPCD, to an off-site emission reduction program within the MBUAPCD jurisdiction. The amount of the contribution shall be agreed upon by the MBUAPCD taking into account the limited duration of cable-laying activities. A description of the emission reduction program and a copy of a receipt for funds committed to the program shall be submitted to the MBUAPCD.

Rationale for Mitigation

Use of on-road diesel fuel designed for motor vehicles would ensure that combustion-related diesel particulate matter emissions from all construction equipment are reduced to the extent feasible. The CARB currently requires low-sulfur fuel (500 ppm sulfur

content) in construction equipment and, in many locations, ultra-low sulfur diesel fuel (15 ppm sulfur content) is already available. In advance of CARB rulemaking, use of on-road diesel fuel in smaller marine vessels (such as research and support boats) would be feasible and appropriate. The cable-laying vessel would operate on heavier distillate and residual fuel oils, which are not available with reduced sulfur content.

Odors from construction equipment diesel exhaust would also be reduced with the recommended use of low-sulfur fuel. No substances used or activities involved with the Project would have the capability to produce offensive odors.

Significant emissions of NOx within the MBUAPCD may be mitigated with contributions to previously established programs administered by the MBUAPCD. Air quality management plans for attainment partially depend on these programs, which provide emission reductions from sources that are not Project-related and traditionally are not regulated. This is a method of offsetting impacts that has been by developed in consultation with the MBUAPCD for other cable-laying projects, i.e., Global West in March 2000. For example, contributions from MBARI could be used to fund the Carl Moyer Program (for upgrading or replacing existing engines in agricultural operations or other local marine operations) and the Clean School Bus Program, depending on the discretion of the MBUAPCD. The MBUAPCD would identify the level of funding necessary to address the impact in a manner consistent with the applicable attainment plan. The funding would in turn be used by the MBUAPCD to secure emission reductions from non-project sources that would be sufficient in quantity and timing to offset the effects of the Project emissions and reduce the Project impact from marine vessels to a less than significant level.

Impact AQ-2: Operation-Phase Emissions

Use of vessels and power provided during operation could cause emissions of ozone precursors and particulate matter. (Class III)

Operation would likely involve increased research activity and occasional inspection and maintenance of the system. Trips of researchers and scientific working groups traveling to the deployed instrumentation would be occasional, and individual instruments could be deployed for weeks or years at a time. Inspections and minor repairs would also be undertaken using an ROV. More major repairs could involve the removal and replacement of cable using a cable laying/repair vessel. Emissions from the scientific and maintenance traffic would be relatively minor and normally limited to on-road mobile sources or smaller marine vessels, which are subject to State and Federal emission standards and fuel requirements, described above.

The MARS submarine ports would consume electricity provided by a network of existing power plants connected to the electrical grid. Emissions from power plants state-wide are generally highly regulated and are low compared to the emissions that would occur if a site-specific stationary electrical generator were to be installed. The quantity of NOx and PM10 emissions occurring from a power plant operating at the State-wide average emission rate would be less than one lb/day for 10 kW over a 24-hour day (CEC 2003).

The combined operational emissions would not exceed the significance thresholds established by the MBUAPCD (Class III).

Table 4.1-6. Summary of Air Quality Impacts and Mitigation Measures

Impact	Mitigation Measures
AQ-1: Vessels used for construction and decommissioning could temporarily exceed daily emission thresholds for ozone precursors and particulate matter within the MBUAPCD. (Class II)	**MM AQ-1a.** Use low-emission fuel in all smaller diesel-powered vessels and in all construction equipment. **MM AQ-1b.** Contribute, as determined by the MBUAPCD, to an off-site emission reduction program within the MBUAPCD jurisdiction.
AQ-2: Use of vessels and power provided during operation could cause emissions of ozone precursors and particulate matter. (Class III)	None required.

4.1.5 Cumulative Impacts

Construction of the proposed Project would cause short-term air quality impacts. Construction impacts could overlap with adverse air quality impacts from other cumulative projects in the region, such as the IODP Borehole Project. Existing emission sources, Project-related construction, and any overlapping cumulative projects could all jointly contribute to exacerbating existing violations of the ambient air quality standards during the brief construction phase. Because Project emissions alone would contribute substantially to existing violations during the short-term construction phase, the short-term impact (Impact **AQ-1**) would also be cumulatively considerable (Class II) and mitigation measures (**MM AQ-1a** and **MM AQ-1b**) would be necessary to reduce the impact to a less than significant level.

Air quality impacts during operation of the proposed Project would be minimal, limited to minor emissions from research activity and electricity consumption. As such, no significant cumulative air quality impacts would occur during operation.

4.1.6 Alternative Landings

Alternative Landing Area 1: Duke Energy Pipeline to MBARI Property

This alternative would cause emissions from marine vessels for cable laying and from equipment at the landing site essentially similar to the proposed Project. Construction of a new access hatch at Moss Landing State Beach would involve equipment similar to that used at the HDD site. Minimal equipment exhaust and fugitive dust emissions would occur in a small area near the access hatch within the park. The on-land construction equipment and dust emissions from on-land activities would be of a similar duration although this alternative would include a shorter HDD (Class III). Emissions from marine vessels would be similar to those of the proposed Project, which would cause a potentially significant impact (Impact **AQ-1**, Class II). Implementation of mitigation measures (**MM AQ-1a** and **MM AQ-1b**) would be necessary to reduce the construction impact to a less than significant level.

Alternative Landing Area 2: Moss Landing Marine Laboratories (MLML) Pier

This alternative would cause emissions from marine vessels for cable laying and from equipment at the landing site essentially similar to the proposed Project. The construction equipment and dust emissions from on-land activities would be of a slightly shorter duration and lesser quantity (Class III) because the cable would terminate at Building C without placement of additional structures and without HDD activities. Emissions from marine vessels would be similar to those of the proposed Project, which would cause a potentially significant impact (**AQ-1**, Class II). Implementation of mitigation measures (**MM AQ-1a** and **MM AQ-1b**) would be necessary to reduce the construction impact to a less than significant level.

No Project/Action Alternative

Emissions from marine vessels and on-land construction equipment would not occur under this alternative. The No Project/Action Alternative would have no effect on air quality beyond emissions that occur under existing MBARI activities.